



Degradation of Diphenylamine by UV & Temperature Influence



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OBJECTIVE

To preserve the diphenylamine sample for longer duration by preventing the factors that would favor its decomposition both in solid & solution form.

ABSTRACT

Diphenylamine, is of great significance in forensic identification as it plays a prominent role as a stabilizer in smokeless gunpowder for evidence in firearm discharge cases. However, there are several factors to be considered if you have to hold sample for a longer time period otherwise due to different factors the decomposition of Diphenylamine itself would start at a comparatively higher rate. High temperature, UV & sunlight have found to increase the degradation rate.

UV EXPOSURE: Sample exposed to UV observed decrease in absorbance in short span.

Time Limit: about 20 minutes

Observation: Decrease in 0.0857% absorbance

METHODOLOGY

Spectroscopic

EXPOSURE TO: SOLUTION REPLICATES

UV RADIATION
DIRECT SUNLIGHT
TEMPERATURE

SOLID (REPLICATES)

DIRECT SUNLIGHT
TEMPERATURE

RESULT & ANALYSIS

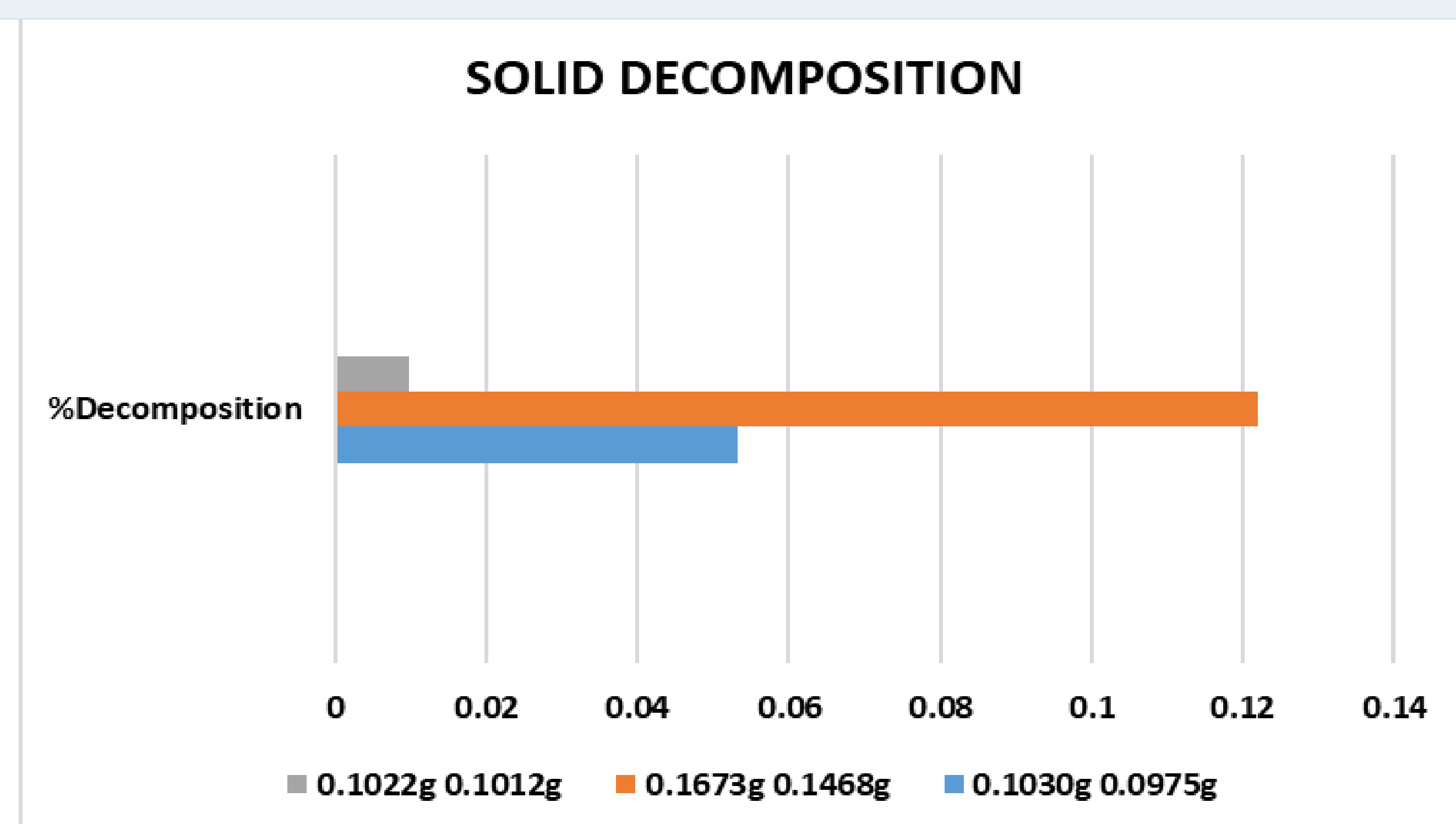
Comparatively higher degradation was observed after 24 hours of rest as compared to absorbance after 5 minutes of rest after temperature exposure.

TEMPERATURE EFFECT ON SOLID

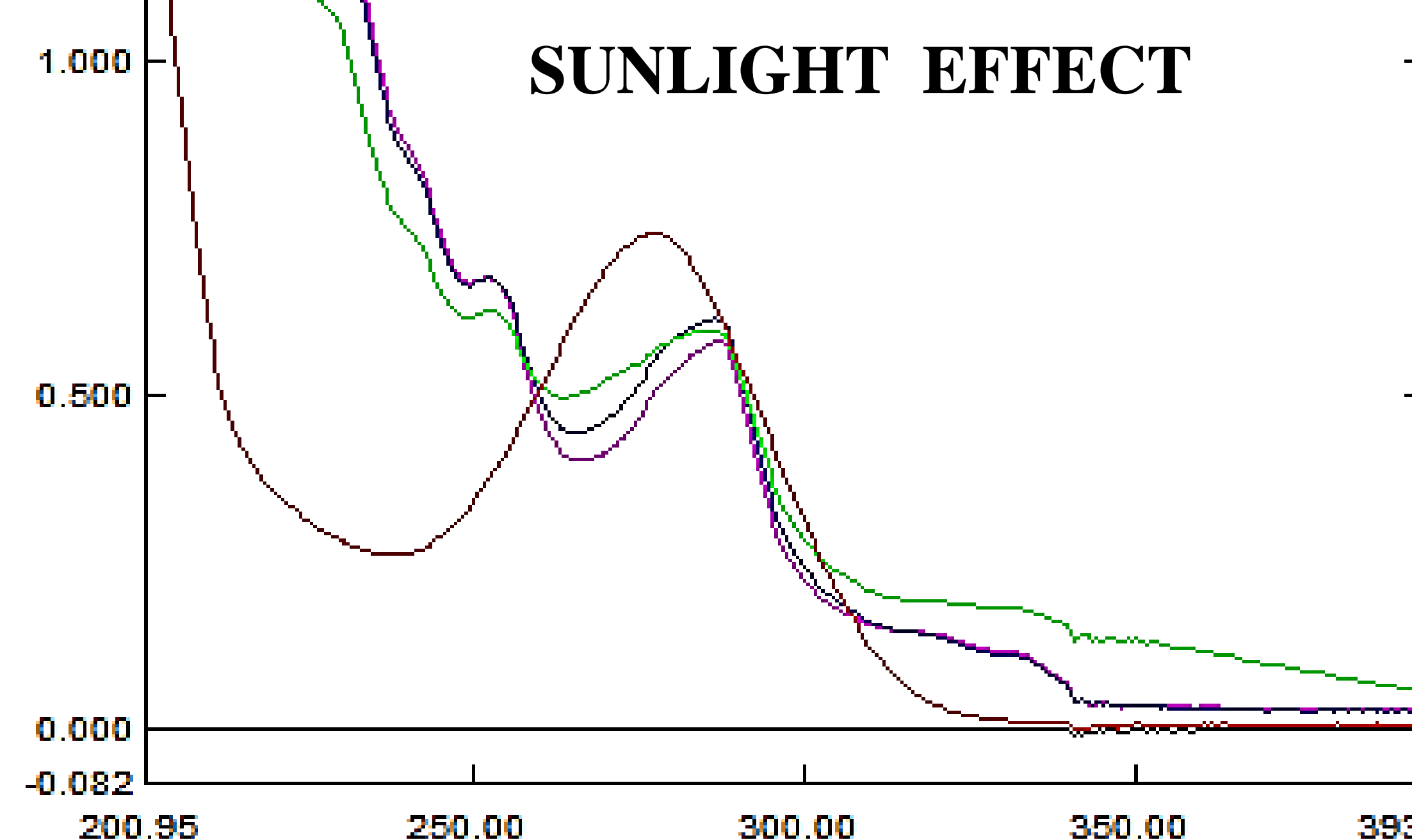
Two conditions were applied for this purpose:

- ✓ Covered sample = decrease after 17 days that is 5.6%
- ✓ Uncovered sample = increase of 2.6 nm absorbance after 17 days (influence of atmospheric components that might have reacted with DPA.)

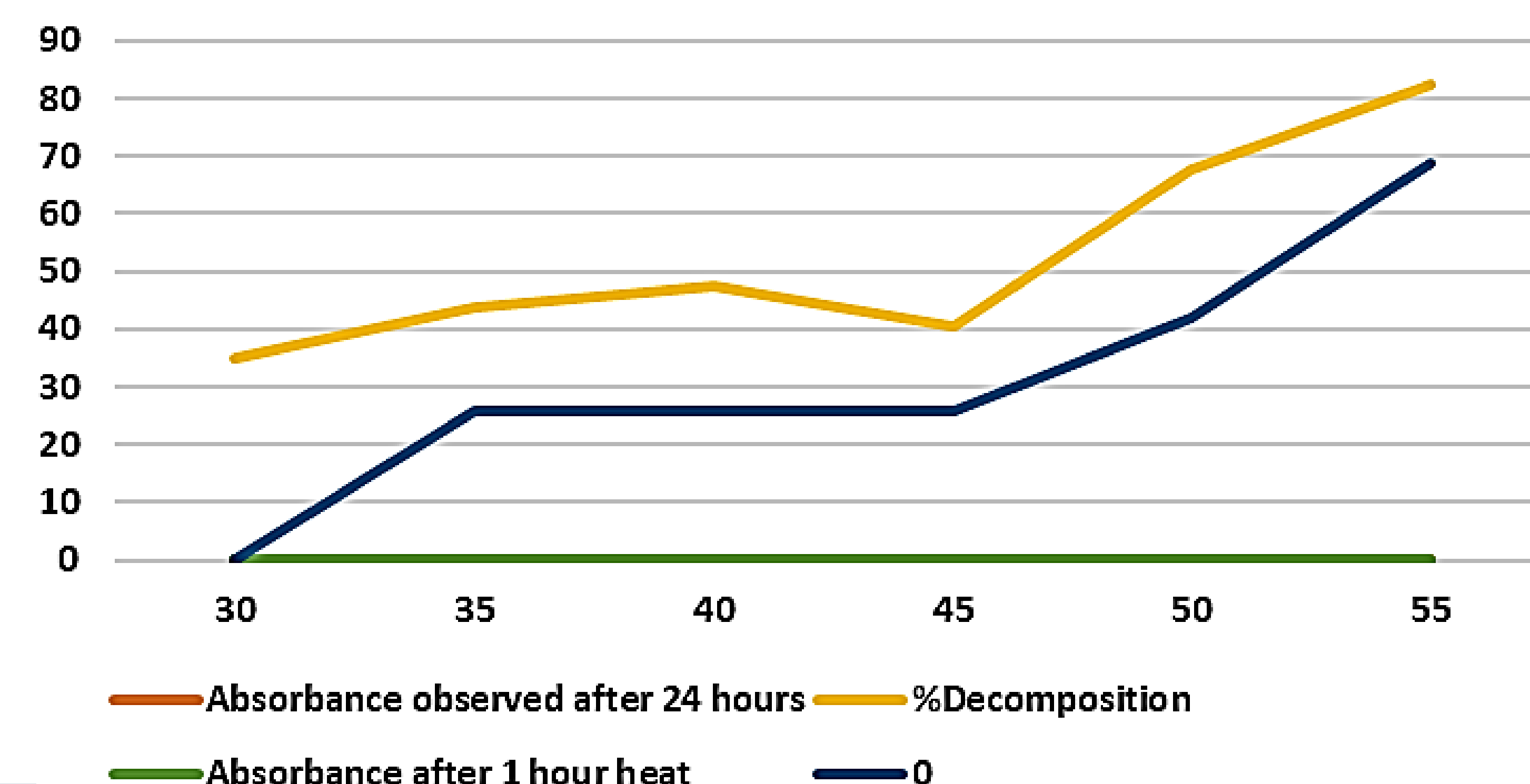
Increases in exposure time diphenylamine solid to sunlight increases decomposition rate



Solution exposure to sunlight produce 4 different peaks at different wavelengths which might be due to structural breakdown or complexation



TEMPERATURE EFFECT



CONCLUSION

To preserve the Diphenylamine sample for longer duration, we would have to keep factors of sunlight, temperature & UV radiation in mind in order to decrease the degradation rate of diphenylamine.

REFERENCES

1. Apatoff, J. B. and G. Norwitz (1973). Role of diphenylamine as a stabilizer in propellants; analytical chemistry of diphenylamine in propellants (A survey report), FRANKFORD ARSENAL PHILADELPHIA PA.
2. Authority, E. F. S. (2012). "Conclusion on the peer review of the pesticide risk assessment of the active substance diphenylamine." EFSA Journal 10(1): 2486.
3. Tong, Y., et al. (2001). "Determination of diphenylamine stabilizer and its nitrated derivatives in smokeless gunpowder using a tandem MS method." Analyst 126(4): 480-484.